

REMARKS

This Amendment is submitted in response to the Examiner's Answer mailed on February 14, 2011. A Request for Continued Examination ("RCE") (\$810.00) is submitted herewith. The Director is authorized to charge \$810.00 for the RCE and any additional fees which may be required, or to credit any overpayment to Deposit Account No. 02-1818. If such a withdrawal is made, please indicate the Attorney Docket No. 3712174-00037 on the account statement.

Claims 26-32 and 35-39 are pending in this application. Claims 1-25 and 33-34 were previously canceled without prejudice or disclaimer. In the Final Office Action, Claim 39 was rejected under 35 U.S.C. §112. Claims 26-32 and 35-39 were rejected under 35 U.S.C. §103. In response, Claims 26 and 39 have been amended. The amendments do not add new matter. At least in view of the amendments and/or for the reasons set forth below, Applicants respectfully submit that the rejections should be withdrawn.

In the Final Office Action, Claim 39 was rejected under 35 U.S.C. §112, second paragraph, as being indefinite. The Patent Office asserts that the limitation "obtained by directly firing" lacks antecedent basis because Claim 26 from which Claim 39 depends recites that the graphite material is "obtained by sintering" rather than "obtained by firing." See, Final Office Action, page 2, lines 13-22. In response, Applicants have amended Claim 26 to recite that the graphite material "comprises sintered meso-carbon micro-beads." Applicants have also amended Claim 39 to recite that the meso-carbon micro-beads "are sintered" at a temperature between 2500° C and 3500° C. These amendments do not add new matter. The amendments are supported in the Specification at, for example, page 3, paragraph 35; page 5, paragraph 82. Therefore, Applicants respectfully submit that Claim 39 has sufficient antecedent basis and is not indefinite.

Accordingly, Applicants respectfully request that the rejection of Claim 39 under 35 U.S.C. §112, second paragraph, be withdrawn.

In the Final Office Action, Claims 26-32 and 35-39 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,772,934 to MacFadden ("*MacFadden*") in view of U.S. Patent No. 6,280,878 B1 to Maruyama et al. ("*Maruyama*"). In response, Applicants have amended Claim 26. In view of the amendment and/or for at least the reasons set forth below, Applicants respectfully submit that, even if combinable, *MacFadden* and *Maruyama* fail to disclose each and every element of the present claims.

Currently amended independent Claim 26 recites, in part, a gel electrolyte secondary cell comprising: a positive electrode; a negative electrode comprising a current collector and a powder mixture composed of a graphite material having a mean particle size of 5 to 100 μm ; and a gel electrolyte comprising an electrolyte salt, a non-aqueous solvent and a high-molecular weight material, wherein the non-aqueous solvent comprises propylene carbonate and ethylene carbonate, wherein a content of propylene carbonate ranges from 10 mol% to 75 mol%, and wherein the graphite material comprises sintered meso-carbon micro-beads. The amendment does not add new matter. The amendment is supported in the Specification at, for example, page 2, paragraphs 27-28 and 32; page 3, paragraph 35; page 4, paragraph 62; page 5, paragraph 82.

If a graphite material is used as a negative electrode in a non-aqueous liquid or gel electrolyte cell, propylene is decomposed due to the instability of propylene carbonate against a graphite material, thereby lowering the charging/discharging efficiency. See, Specification, page 2, paragraph 20. The degree of decomposition of propylene carbonate depends on the physical properties of the graphite material. See, Specification, page 2, paragraph 21, lines 1-7. In a non-aqueous liquid electrolyte cell using propylene carbonate in the electrolyte, it is desirable to use graphite having a large particle size because the contact area of the graphite material with the liquid electrolyte is smaller. See, Specification, page 2, paragraph 21, lines 7-15.

However, in a non-aqueous gel electrolyte cell, a graphite material having a smaller particle size is desirable in order to maintain the electron and ion conductivities between the particles of the graphite material in the anode. See, Specification, page 2, paragraphs 22-23. This is because if the particle size is too large, the ion conduction path is increased, thereby increasing the impedance to lower the cell voltage and deteriorating the cell performance. See, Specification, page 2, paragraph 24. The present claims therefore provide a gel electrolyte secondary cell including a negative electrode powder mixture composed of a graphite material having a mean particle size of 5 to 100 μm , wherein the graphite material comprises sintered meso-carbon micro-beads; and a gel electrolyte comprising an electrolyte salt, a non-aqueous solvent and a high-molecular weight material, wherein the non-aqueous solvent comprises propylene carbonate. By providing a gel electrolyte including the sintered meso-carbon micro-beads in combination with propylene carbonate, a small particle size of 5 to 100 μm may be used without substantially decreasing the discharge capacity loss. See, Specification, page 2, paragraphs 26-28. In addition, because the propylene carbonate is contained in the gel electrolyte, a high ion conductivity may be obtained. See, Specification, page 1, paragraph 18.

For example, even if combinable, *MacFadden* and *Maruyama* fail to disclose or suggest a gel electrolyte secondary cell wherein the graphite material comprises sintered meso-carbon micro-beads as recited, in part, by Claim 26. The Patent Office asserts that the phrase “obtained by sintering meso-carbon micro-beads” is a product-by-process limitation which should not be given patentable weight “in the absence of unexpected results.” See, Final Office Action, page 2, lines 6-9. In response, Applicants have amended Claim 26 to recite that “the graphite material comprises sintered meso-carbon micro-beads.”

Applicants respectfully submit that the phrase “comprises sintered meso-carbon micro-beads” is not a product-by-process limitation but rather the recitation of a specific material. Nowhere do *MacFadden* or *Maruyama* teach or even suggest a graphite material which comprises sintered meso-carbon micro-beads. Instead, *MacFadden* merely discloses a carbon anode active material in which “[t]he preferred forms of carbon include graphite and coke.” See, *MacFadden*, column 4, lines 9-13. Similarly, *Maruyama* merely teaches a battery wherein “[t]he carbon used as the active material may be properly selected from natural or artificial graphite.” See, *Maruyama*, column 5, lines 9-10. As such, even if combinable, *MacFadden* and *Maruyama* fail to disclose a graphite material comprising sintered meso-carbon micro-beads.

Accordingly, Applicants respectfully request that the rejection of Claims 26-32 and 35-39 under 35 U.S.C. §103(a) to *MacFadden* and *Maruyama* be withdrawn.

In the Final Office Action, Claims 26-32 and 35-39 were rejected under 35 U.S.C. §103(a) as being unpatentable over *MacFadden* in view of U.S. Patent No. 5,522,127 to Ozaki et al. (“*Ozaki*”). In response, Applicants have amended Claim 26. In view of the amendment and/or for at least the reasons set forth below, Applicants respectfully submit that, even if combinable, *MacFadden* and *Ozaki* fail to disclose every element of Claims 26-32 and 35-39.

For example, even if combinable, *MacFadden* and *Ozaki* fail to disclose or suggest using sintered meso-carbon micro-beads having the claimed size in combination with a solvent containing propylene carbonate as required, in part, by Claim 26. *MacFadden* merely discloses using graphite in a solid polymer electrolyte cell containing propylene carbonate and fails to teach that the graphite has the claimed size or comprises sintered meso-carbon micro-beads. See, *MacFadden*, column 4, lines 9-13; column 5, lines 11-20. *Ozaki* merely discloses a micro-bead based electrode with a liquid electrolyte and fails to teach the claimed combination of sintered meso-carbon micro-beads having the claimed size and a solvent containing propylene carbonate. See, *Ozaki*, column 2, lines 66-67; column 3, lines 1-7; column 4, lines 54-58.

Moreover, a gel electrolyte secondary cell including the claimed combination of sintered meso-carbon micro-beads having the claimed size and a solvent containing propylene carbonate would not have been obvious to one of ordinary skill in the art because the claimed combination achieves unexpected results when combining propylene carbonate with graphite comprising sintered meso-carbon micro beads. For example, Table 1 demonstrates initial charging/discharging efficiencies of 82.8% and 82.6% in a gel electrolyte cell containing propylene carbonate when a sintered material of meso-carbon micro-beads is used as the anode material, whereas a significantly lower efficiency of only 61% is achieved in the same gel electrolyte cell when the anode material is substituted with a graphite material obtained by firing petroleum coke. See, Specification, page 4, paragraph 62; page 5, paragraphs 69, 71-72 and 77-78; Table 1. Similarly, Table 2 demonstrates initial charging/discharging efficiencies of 74.5% and 74.1% in a gel electrolyte cell containing propylene carbonate when a graphite material comprised of sintered meso-carbon micro-beads is used as the anode material, whereas a significantly lower efficiency of only 56% is achieved in the same gel electrolyte cell when the anode material is substituted with a graphite material obtained by firing petroleum coke. See, Specification, page 5, paragraph 82; page 6, paragraphs 87-88 and 91-93; Table 2. As such, one of ordinary skill in the art would understand that the claimed combination of sintered meso-carbon micro-beads and propylene carbonate achieves unexpected results over propylene carbonate used with graphite comprising fired petroleum coke.

Accordingly, Applicants respectfully request that the rejection of Claims 26-32 and 35-39 under 35 U.S.C. §103(a) to *MacFadden* and *Ozaki* be withdrawn.

In the Final Office Action, Claims 26-32 and 35-39 were rejected under 35 U.S.C. §103(a) as being unpatentable over European Patent No. 0724305 B1 to Akashi ("*Akashi*") in view of *Ozaki*. In response, Applicants have amended Claim 26. In view of the amendment and/or for at least the reasons set forth below, Applicants respectfully submit that, even if combinable, *Akashi* and *Ozaki* fail to disclose each and every element of the present claims.

For example, even if combinable, *Akashi* and *Ozaki* fail to disclose or suggest a gel electrolyte secondary cell including sintered meso-carbon micro-beads having the claimed size in combination with a solvent containing propylene carbonate as required, in part, by Claim 26. As discussed previously, *Ozaki* merely discloses a micro-bead based electrode with a liquid electrolyte and fails to teach the claimed combination of sintered meso-carbon micro-beads having the claimed size and a solvent containing propylene carbonate. See, *Ozaki*, column 2,

lines 66-67; column 3, lines 1-7; column 4, lines 54-58. Further, *Akashi* is too general in scope to lead one skilled in the art to the gel electrolyte secondary cell as specifically claimed, when considered in combination with *Ozaki*. For example, *Akashi* teaches generally using "graphite" as a carbonaceous negative electrode material but in its examples discloses using propylene carbonate with a lithium metal anode. See, *Akashi*, page 5, lines 3-16; page 10, lines 29-40; page 11, lines 1-6. Thus, even if combinable, *Akashi* and *Ozaki* fail to disclose using sintered meso-carbon micro-beads having the claimed size in combination with a solvent containing propylene carbonate in accordance with the present claims.

Moreover, a gel electrolyte secondary cell including the claimed combination of sintered meso-carbon micro-beads having the claimed size and a solvent containing propylene carbonate would not have been obvious to one of ordinary skill in the art because the claimed combination achieves unexpected results when combining propylene carbonate with graphite comprising sintered meso-carbon micro beads. For example, Table 1 demonstrates initial charging/discharging efficiencies of 82.8% and 82.6% in a gel electrolyte cell containing propylene carbonate when a sintered material of meso-carbon micro-beads is used as the anode material, whereas a significantly lower efficiency of only 61% is achieved in the same gel electrolyte cell when the anode material is substituted with a graphite material obtained by firing petroleum coke. See, Specification, page 4, paragraph 62; page 5, paragraphs 69, 71-72 and 77-78; Table 1. Similarly, Table 2 demonstrates initial charging/discharging efficiencies of 74.5% and 74.1% in a gel electrolyte cell containing propylene carbonate when a graphite material comprised of sintered meso-carbon micro-beads is used as the anode material, whereas a significantly lower efficiency of only 56% is achieved in the same gel electrolyte cell when the anode material is substituted with a graphite material obtained by firing petroleum coke. See, Specification, page 5, paragraph 82; page 6, paragraphs 87-88 and 91-93; Table 2. As such, one of ordinary skill in the art would understand that the claimed combination of sintered meso-carbon micro-beads and propylene carbonate achieves unexpected results over propylene carbonate used with graphite comprising fired petroleum coke.

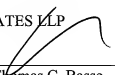
Accordingly, Applicants respectfully request that the rejection of Claims 26-32 and 35-39 under 35 U.S.C. §103(a) to *Akashi* and *Ozaki* be withdrawn.

For the foregoing reasons, Applicants respectfully submit that the present application is in condition for allowance and earnestly solicit reconsideration of same.

Respectfully submitted,

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